

Please rewrite claim 22 as set forth below in clean form. 7

22. **(Amended)** A clutch facing material as set forth in claim 4, wherein said heat conducting elements comprise copper threads, said copper threads being woven with said aramid fibers.

Please rewrite claim 23 as set forth below in clean form. 7

23. **(Amended)** A clutch facing material as set forth in claim 8, wherein the varying concentration of said plurality of heat conducting elements comprises a decrease in concentration of said plurality of heat conducting elements over a depth of about 0.05 inches to about 0.10 inches.

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Additionally, in accordance with 37 CFR 1.121(c)(1)(ii), all amended claims are set forth in marked up versions in the pages attached to this Amendment.

REMARKS

After carefully reviewing the final Office Action mailed October 17, 2002, this Continuation Application and Preliminary Amendment are being submitted. Claims 1-8 and 11-15 and 20-23 have been amended to more particularly define the present invention. Claims 9 and 10 have been cancelled without prejudice. Reconsideration of the application, as amended, is requested.

Claims 1 and 11 have been amended to define the friction material as clutch facing material. Basis for this amendment is found in dependent claim 9 which has now been cancelled without prejudice.

The Examiner rejected Claims 1-4, 6-12, 14, 15, 20, 21, and 23 under 35 U.S.C. §103(a) as being unpatentable over the Booher patent (U.S. Patent No. 5,156,787) in view of the Miyamoto et al. patent (U.S. Patent No. 6,001,440). The Examiner has acknowledged that the Booher patent fails to teach that the heat conducting elements are situated within the functionally graded material with a varying concentration (Paper No. 10 mailed 6/4/02, page 2), but looks to the Miyamoto et al. patent as teaching this feature.

The Applicant respectfully traverses this rejection for the following reasons. Booher specifically teaches that heat conducting elements such as powders of graphite, copper or

the like are uniformly distributed throughout the resin material to aid in the dissipation of heat, note column 2, lines 50-60.

This specifically teaches away from the proposed combination with the Miyamoto et al. patent. The Miyamoto et al. patent teaches of using a heat conductive powder with a concentration gradient for a thin film material.

The Applicant respectfully submits that one of ordinary skill in this art would not look to combine the teachings of the Miyamoto et al. patent with the contrary teachings of the Booher patent. Moreover, the Miyamoto et al. patent particularly relates to thin films suited for laser printers and electrophotographic copying machines as described in column 1 of that patent. There is no mention of a clutch facing material or even friction material in the Miyamoto et al. patent. Even though a reference is capable of being modified, there must be a suggestion or motivation other than that gleaned from the instant application to do so, In re Fritch, 23 USPQ2d 1780 (Fed. Cir. 1992).

Absent the teachings of the instant invention, there is no motivation for one of ordinary skill in this art to modify the references particularly when the reference teaches away from the proposed combination. The Booher patent teaches of uniformly distributing heat conducting elements which is completely opposite that of the instant invention.

The Examiner further rejected Claims 1, 2, 4-12, 14, 20, 21 and 23 under 35 U.S.C. §103 as being unpatentable over the Shibata et al. patent (U.S. Patent No. 5,004,497) in view of the Miyamoto et al. patent.

The Examiner again has acknowledged that the Shibata et al. patent fails to teach that the heat conducting elements are situated within a functionally graded material in a selected orientation and spatial distribution with a varying concentration (Paper No. 10, 6/4/02, page 5). The Examiner looks once more to the Miyamoto et al. patent as teaching this deficiency.

The Applicant respectfully traverses this rejection for the foregoing reasons as well as the following.

The Shibata et al. patent, in column 3, line 63 through column 4, line 22, describes carbon fibers as having a high thermal conductivity and being evenly distributed. Note in particular column 4, lines 20-22. The Shibata et al. patent like the Booher patent does mention clutch facing material, but specifically teaches of uniformly or evenly distributing heat conducting elements through the friction material. One of ordinary skill in the art of friction material would only consider a uniform distribution of heat conducting elements based on these teachings. That one of skill in the friction material art would not look or even consider a patent such as Miyamoto since it is directed to electronic thin film application, like, laser printers.

As argued previously, the Shibata et al. patent teaches away from the varying concentration recited in the claims of the instant application and the teachings of Miyamoto et al.

It is an axiom of patent law that modifying one reference with the teachings of another is wholly improper unless the advantage of such a combination is suggested in the prior art, In re Dow Chemical Co., 5 USPQ2d 1529, 1532 (Fed. Cir. 1988).

The dependent claims contain the believed allowable subject matter of the independent claims from which they depend and serve to further define and limit the instant invention.

The Applicant for the record expresses his disappointment with the responsiveness of the United States Patent and Trademark Office in that Applicant requested a telephone interview as permitted by law for this case in the interest of advancing the prosecution.

Applicant made this request several times during the response period, but was denied the opportunity due to the misplaced case file.

In view of the above, the Applicant respectfully submits that all of the claims are in condition for allowance. Reconsideration of the rejections is requested. Allowance of the claims at an early date is solicited.

Respectfully submitted,



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MARKED UP VERSION OF ALL AMENDED CLAIMS

1. **(Four Times Amended)** A [friction] clutch facing material with improved wear resistance and thermal conductivity, comprising:
a functionally graded material including a composite material having heat and wear resistant fibers [with a varying concentration] therein impregnated with a resin; and
a plurality of heat conducting elements situated within said functionally graded material in a selected orientation and spatial distribution with a varying concentration, wherein said functionally graded material is constructed for engagement with a cooperating movable member, said functionally graded material including a first friction surface constructed for such engagement and a second non-engaging surface, said varying concentration of said heat conducting elements decreasing in concentration from said first friction surface to said second non-engaging surface, said heat conducting elements transferring heat away from the first friction surface of said functionally graded material to the second non-engaging surface[, said heat and wear resistant fibers increasing in concentration from said first friction surface to said second non-engaging surface].
2. **(Amended)** A [friction material] clutch facing material as set forth in claim 1, wherein said plurality of heat conducting elements comprise members selected from the group consisting of filaments, threads, wires, powders, and particulate, said heat conducting elements being disposed in said functionally graded material in a predetermined arrangement.
3. **(Twice Amended)** A [friction material] clutch facing material as set forth in claim 1, wherein said plurality of heat conducting elements are positioned substantially normal to said first friction surface of said functionally graded material.
4. **(Amended)** A [friction material] clutch facing material as set forth in claim 1, wherein said heat and wear resistant fibers comprise aramid fibers.

5. **(Amended)** A [friction material] clutch facing material as set forth in claim 4, wherein said aramid fibers comprise Kevlar fibers.
6. **(Amended)** A [friction material] clutch facing material as set forth in claim 2, wherein said plurality of heat conducting elements comprise members selected from the group consisting of metal, metal alloy, copper, copper alloy, and graphite compositions.
7. **(Amended)** A [friction material] clutch facing material as set forth in claim 1, wherein said fibers comprise members selected from the group consisting of minerals, glass, asbestos, cotton, polyester, graphite, carbon, pyrolytic carbon, aramid, synthetic, and polymer fibers.
8. **(Twice Amended)** A [friction material] clutch facing material as set forth in claim 1, wherein said heat conducting elements comprise a greater density on said first friction surface than said second non-engaging surface.
11. **(Four Times Amended)** In a composite [friction] clutch facing material having opposed surfaces with one surface engaging a movable, engageable part, the improvement comprising heat conducting elements disposed in said composite [friction] clutch facing material in a selected arrangement and a varying concentration for transferring heat away from said engaging surface to a non-engaging surface, said varying concentration of said heat conducting elements decreasing in concentration from said first [friction] surface to said second non-engaging surface[, said heat conducting elements being woven with fibers forming the composite friction material, said fibers increasing in concentration from said first friction surface to said second non-engaging surface].
12. **(Amended)** The [friction material] clutch facing material according to claim 11, wherein said heat conducting elements comprise a plurality of metal components disposed within said friction material.
13. **(Twice Amended)** The [friction material] clutch facing material according to claim 12, wherein said plurality of metal components comprise members

selected from the group consisting of filaments, threads, and wires.

14. **(Amended)** The [friction material] clutch facing material according to claim 13, wherein said plurality of metal components comprise members selected from the group consisting of copper components and copper alloy components.
15. **(Amended)** The [friction material] clutch facing material according to claim 12, wherein said metal components are oriented substantially perpendicular to said engaging surface.
20. **(Amended)** The [friction material] clutch facing material according to claim 11, wherein said heat conducting elements comprise a greater density on said engaging surface than on said non-engaging surface.
21. **(Amended)** A [friction material] clutch facing material as set forth in claim 8, wherein the density of said heat conducting elements on said first friction surface ranges between about 22.5% to about 42.5% on a weight percent basis.
22. **(Amended)** A [friction material] clutch facing material as set forth in claim 4, wherein said heat conducting elements comprise copper threads, said copper threads being woven with said aramid fibers.
23. **(Amended)** A [friction material] clutch facing material as set forth in claim 8, wherein the varying concentration of said plurality of heat conducting elements comprises a decrease in concentration of said plurality of heat conducting elements over a depth of about 0.05 inches to about 0.10 inches.